

# **Washington Aviation System Pavement Needs Report**

## **Policy Summary**



**Washington State  
Department of Transportation**

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**Policy Summary  
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## EXECUTIVE SUMMARY

Pavement condition is a critical measure of airport performance, and is important both from a cost effectiveness and aviation safety standpoint. Maintenance and preservation of runway, taxiway and apron pavements represents one of the largest capital investments in the aviation system. Ongoing pavement maintenance is critical because repairs are much more costly once the condition deteriorates below a certain level. Additionally, pavement condition plays a critical role in aviation safety. Aircraft perform takeoffs and landings under extremely high speeds, and are therefore vulnerable to cracks, loose debris, and other pavement weaknesses that result from inadequate maintenance.

WSDOT Aviation recently completed a system-wide study of pavement to assess the existing condition of runways, taxiways and aprons at 96 public use airports<sup>1</sup> across Washington State. The study also estimated funding needs to maintain the system at an acceptable level.

The *Pavement Condition Index* (PCI) was used to evaluate the system. While there are many indicators of pavement condition and need, the PCI is the national standard when evaluating airport conditions at the state level. The PCI measures pavement quality on a scale of 0 to 100. A pavement with a PCI score of 100 is in great condition; a pavement with a PCI of 0 is essentially rubble.

The cutoff level between a pavement that can be sustained through maintenance (such as a slurry seal) and one that will need major rehabilitation (such as an overlay) varies depending on the type of distress present and the rate of deterioration. However, in general, pavements will require major rehabilitation when they reach between a 60 to 70 PCI.

Like the roof of a house, it is more cost effective to keep pavement in good condition rather than allowing it to deteriorate to the point where, not only the top layer, but also the underlying structure must be repaired or replaced. **For example, an overlay costs approximately four times as much as a slurry seal and reconstruction costs approximately seven times as much as an overlay.**

### What Did We Learn?

As of 2005, 23 percent of Washington State's 113 million square feet of pavement infrastructure had deteriorated to a point where costly rehabilitation or even reconstruction was needed. The useable life of the remaining pavements can be prolonged with preventive maintenance actions such as crack sealing, joint sealing, and surface treatments. However, if this work is delayed, more costly work will be needed in the future.

An analysis of pavement conditions revealed a total system need of over \$388 million through 2012. Of that, almost \$194 million is for the non-primary airports, which are airports with 10,000 or fewer passenger boardings per year. If current federal and state funding levels for non-primary airports remain constant, only approximately \$31.5 million will be invested in the non-primary pavement system through 2012. This leaves a backlog of almost \$163 million in pavement projects. Further, without additional investments, the area-weighted average PCI of non-primary airports would drop from the current 80 to 73 in 2012. This decrease would result

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<sup>1</sup> The following airports are not included in the analysis: Seattle-Tacoma International Airport, Bellingham International Airport, Spokane International Airport, and Tri-Cities Airport. Each of these facilities maintain their own *Airport Pavement Management System* (APMS), and did not participate in the state study.

in many of the individual pavements deteriorating to the point where rehabilitation or reconstruction, rather than preventive maintenance, would be necessary.

### **Weighing the Funding Options**

Recognizing the urgency to identify strategies to guide decision makers in prioritizing the over \$163 million in unfunded needs at non-primary airports, WSDOT Aviation conducted additional analysis. The following represents the range of funding options:

#### No Funding

If no funding is provided for pavement maintenance or rehabilitation the pavement system of the 96 airports would experience a slow but steady decline in condition, with an anticipated PCI of 68 by 2012. This would significantly increase the number of pavement sections that go from the preventive maintenance category to the much more expensive major rehabilitation category.

#### Unlimited Funding

If all maintenance and rehabilitation projects were to be funded, an approximate total of **\$388 million would be needed over the next 7 years**. The overall PCI would raise to above 78 by 2012.

#### Current Level of Funding

Under the current funding level, \$31.5 million of projects would be funded, leaving a backlog of over \$163 million for the non-primary airports. Under this funding scenario, the area-weighted PCI for the non-primary airports would drop to 73 by 2012.

#### Funding Needs by State Airport Classification

Using a state classification system introduced in the Long-Term Air Transportation Study (LATS), the analysis evaluated the pavement-related needs of *Commercial Service* airports, *Regional Service* airports, *Local Community Service* airports, and *Recreation or Remote* airports.

### Key Findings:

## Commercial Service

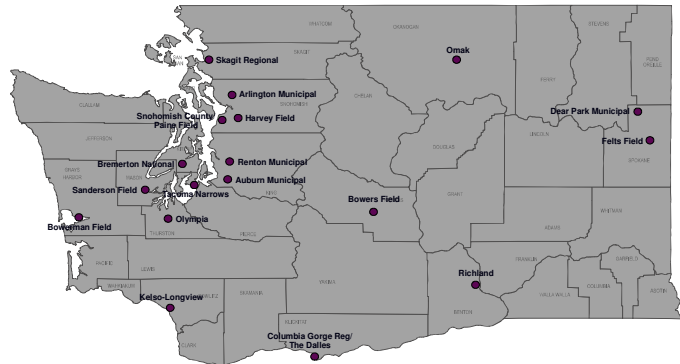
The total funding required to meet pavement condition needs for 10 Commercial Service airports in Washington State is \$240 million.



*Note: The following airports maintain individual pavement management programs and were not included in the analysis: Seattle-Tacoma International, Bellingham International, Spokane International, and Tri-Cities.*

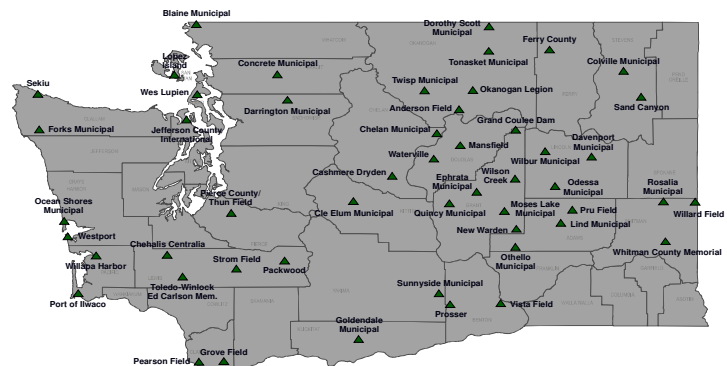
## Regional Service

The total funding required to meet pavement condition needs for 17 Regional Service airports is \$90 million.



## Local Community Service

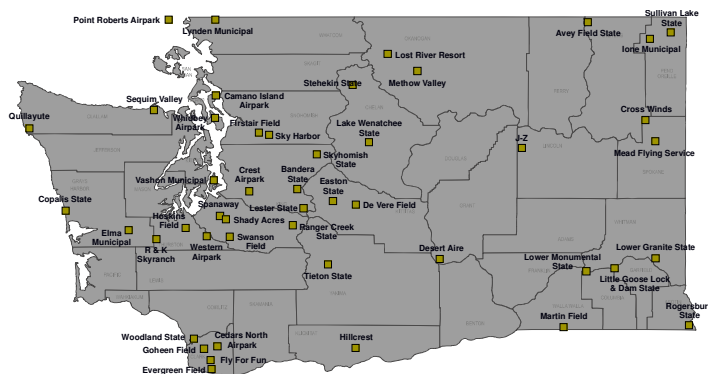
The total funding required to meet pavement condition needs for 51 Local Community Service airports is \$48 million.



*Note: Airports without paved runways were not included in the analysis.*

## Recreation or Remote

The total funding required to meet pavement condition needs for 18 Recreation or Remote airports is \$10 million.



*Note: Airports without paved runways were not included in the analysis.*

## **Addressing the Need**

A tremendous gap exists between the funding need and the resources available to meet that need. Therefore, it is imperative to reasonably weigh the options and select those that would produce the maximum benefit to the statewide aviation system.

The following strategies could be employed to extend the life of airport pavements and address remaining needs:

- **Add preventive maintenance requirements to grant eligibility criteria.** Preventative maintenance, which includes crack sealing, surface treatments, etc., is the key to cost-effectively prolonging the life of a pavement system. WSDOT Aviation should require state grant applicants to participate in a pavement maintenance program.
- **Maximize the effectiveness of the funds available.** Since insufficient funds are available to complete all identified pavement projects, it is important to maximize the effectiveness of the funds that are made available. The state classification system could be used to target investments in the pavement infrastructure by prioritizing funding based on airport type and function. Commercial Service and Regional Service airports would receive highest priority in receiving funding.
- **Customize performance goals based on airport classification.** Existing performance measures for statewide pavement condition should be evaluated and modified as needed. Instead of using a single performance goal for the entire system, measures should be adopted that set different performance goals based on the classification of the airport (Commercial Service, Regional Service, Community Local, etc.) and the use of the pavement (runway, taxiway, or apron).
- **Adjust PCI level standard to focus limited funding on critical pavements.** In addition to monitoring the average PCI of the pavement system, consideration should also be given to establishing performance measures based on minimum allowable condition levels. For example, primary runways at commercial and regional airports should not be allowed to deteriorate below an established PCI level. This approach would focus limited funding on the critical pavements from both a safety and an economic viewpoint.

- **Pursue additional funding to meet pavement condition needs.** While implementation of the physical and policy strategies identified above will help prolong the life of system pavements and target existing funding towards critical needs, additional investment will be needed to avoid deterioration of the state system.

## TABLE OF CONTENTS

INTRODUCTION .....	1
Background.....	1
Benefits of Airport Pavement Management System .....	1
Project Airports .....	1
Overall Pavement Condition.....	2
Funding Scenarios .....	2
THE 2006 PAVEMENT CONDITION STUDY .....	3
EXISTING CONDITIONS.....	4
METHODOLOGY .....	5
Pavement Evaluation Procedure .....	5
Typical Distress Types at Washington Airports.....	6
Overall Pavement Condition.....	8
PAVEMENT NEEDS ASSESSMENT.....	9
PAVEMENT REHABILITATION PROGRAM.....	10
Analysis Process.....	10
Analysis Results.....	10
DISCUSSION & RECOMMENDATIONS .....	14

## APPENDICES

- Appendix A. Airport classification and condition information.
- Appendix B. Unit cost and work policy information.
- Appendix C. Major rehabilitation and global maintenance funding needs through 2012.

# INTRODUCTION

## Background

Washington's airport system represents a very large capital investment and plays a critical role in the economic health of the state. As this system has aged, the upkeep of the existing pavements at the airports has become increasingly important, both from an economic and a safety viewpoint. Ongoing airport pavement maintenance is crucial because repairs are much more costly once the condition deteriorates below a certain level. Additionally, airport pavement weaknesses, such as cracks and loose debris, pose a significant safety risk to aircraft.

Therefore, in 2000 the Washington State Department of Transportation (WSDOT) Aviation, through funding from the Federal Aviation Administration (FAA), established a statewide airport pavement management system (APMS) for selected Washington airports. All airports included were in the Washington State Airport System Plan (WSASP) and the FAA National Plan of Integrated Airport Systems (NPIAS). The APMS enables WSDOT and the FAA to monitor pavement conditions, identify system needs, make programming decisions for funding, provide information for legislative decision making, and assist local jurisdictions with planning decisions.

## Benefits of Airport Pavement Management System

The APMS yields many benefits. It provides WSDOT and the FAA with the information needed to monitor the condition of the pavements to ensure they are able to safely accommodate aircraft traffic. Further, the APMS provides insight into when pavement projects should be conducted and what type of project would be most beneficial. The timing of projects and the selection of repair strategy is very important because preventive maintenance actions (such as crack sealing and joint resealing) when a pavement is in good condition can cost-effectively extend the life of a pavement for several years. If the pavement is allowed to continue to deteriorate, the cost for the major rehabilitation will increase significantly as the pavement structure becomes compromised. The APMS provides the information needed to develop the most cost-effective strategy for keeping a pavement in safe operational condition throughout its life cycle.

## Project Airports

In the initial implementation of the APMS in 2000, 83 public use paved airports were evaluated. During the 2005/2006 update, the APMS database was expanded to include 96 public use airports<sup>2</sup> (see Appendix A). All 96 airports are in the WSASP and 57 are in the FAA NPIAS. The NPIAS identifies more than 3,300 airports in the U.S. that are significant to national air transportation and thus eligible to receive Federal grants under the Airport Improvement Program.

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<sup>2</sup> The following airports are not included in the analysis: Seattle-Tacoma International Airport, Bellingham International Airport, Spokane International Airport, and Tri-Cities Airport. Each of these facilities maintain their own *Airport Pavement Management System* (APMS), and did not participate in the state study.

## **Overall Pavement Condition**

The pavements at Washington airports were evaluated using the Pavement Condition Index (PCI) procedure. The final calculated PCI value is a number from 0 to 100, with 100 representing a pavement in excellent condition and 0 representing a completely failed pavement. A PCI of 40 or less is indicative of a pavement needing complete replacement; those in the range of 40 to 70 often can be repaired with major rehabilitation such as an overlay; above that range preventive maintenance is often a viable alternative.

## **Funding Scenarios**

Several funding scenarios for pavement maintenance and rehabilitation were evaluated during this project to identify funded and unfunded needs. The scenarios involved varying combinations of FAA and WSDOT funds. Evaluations were performed for the following funding options:

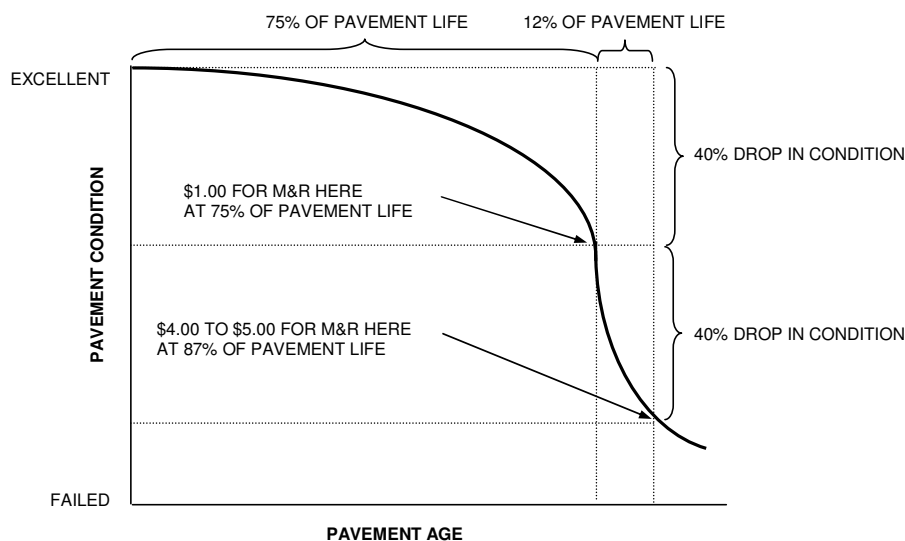
- No funding
- Unlimited funding
- Current level funding
- State classification prioritization funding

## THE 2006 PAVEMENT CONDITION STUDY

Applied Pavement Technology, Inc. (APTech), with assistance from CH2M HILL and CivilTech Engineering, updated the Washington State Department of Transportation (WSDOT) Aviation's Airport Pavement Management System (APMS). The principal objective for the project was to assess the condition of pavements at selected airports in the Washington State in order to improve safety and cost-effectiveness. Pavements were assessed at airports in the Washington State Airport System Plan (WSASP) and the Federal Aviation Administration (FAA) National Plan of Integrated Airport Systems (NPIAS) using the FAA Pavement Condition Index (PCI) methodology. The pavement condition data were then incorporated into the APMS database and used to develop strategies for maintenance and rehabilitation (M&R) that result in the lowest life cycle cost.

The updated APMS database provides WSDOT and the FAA with the up-to-date objective data needed to determine the validity of pavement-related funding requests, to prioritize such projects when funding levels are insufficient, and to determine whether projects are being requested in a timely manner. The timing of projects is important because preventive maintenance actions (such as crack sealing and joint resealing) can extend the life of a pavement in a very cost-effective manner. Once a pavement has deteriorated to the point where preventive maintenance is no longer the appropriate repair, it is critical to step in with major rehabilitation (such as an overlay) as soon as possible. If the pavement is allowed to continue to deteriorate, the cost for the major rehabilitation will increase significantly as the pavement structure becomes compromised. At some point, the pavement structure will become so degraded that the only viable alternative remaining is very costly reconstruction. In addition, there is a point where the pavement becomes unsafe for aircraft.

The importance of identifying not only the type of repair but also the optimal time of repair is illustrated in the figure below. This figure shows that there is a point in a pavement's life cycle where the rate of deterioration increases. The financial impact of delaying repairs beyond this point can be severe.

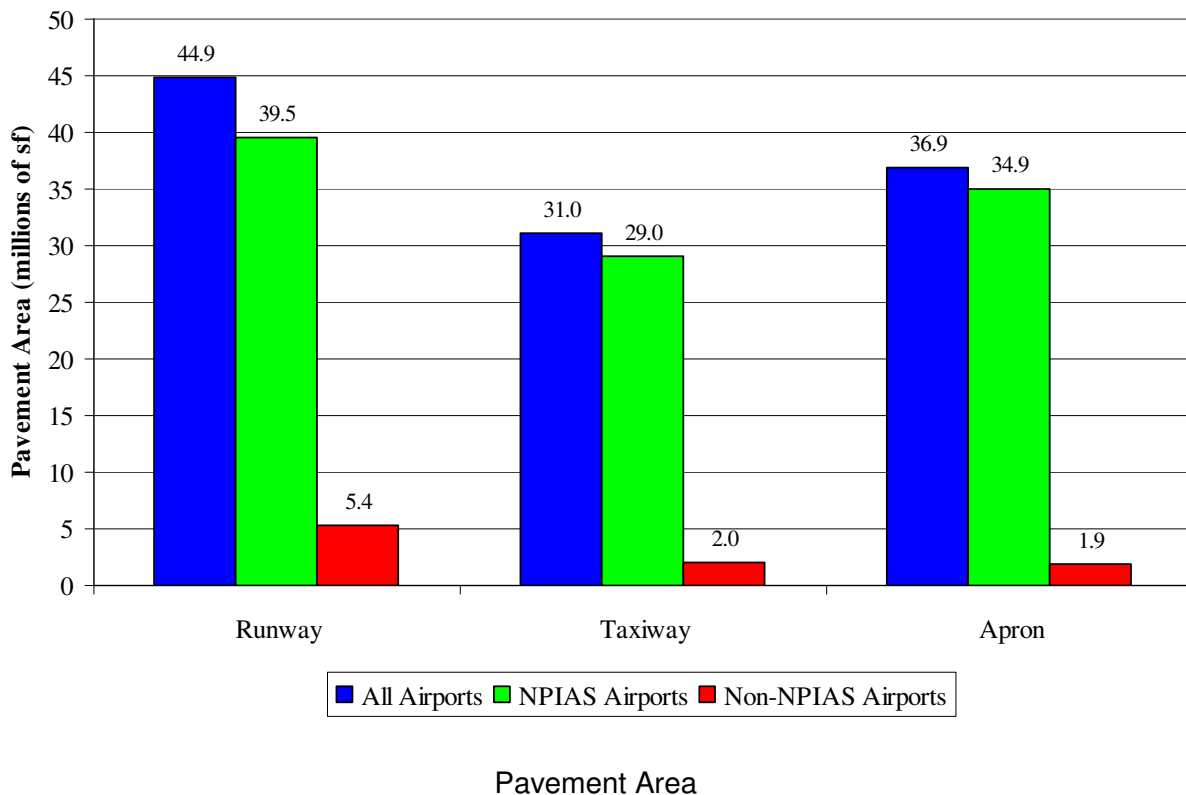


Pavement Condition Versus Cost of Repair

## EXISTING CONDITIONS

During the 2005/2006 update to the APMS, 96 airports (see Appendix A) were evaluated. All 96 public use airports<sup>3</sup> are in the WSASP and 57 are in the FAA NPIAS. The WSASP includes all public-use airports in Washington. The NPIAS identifies airports that are significant to national air transportation and thus eligible to receive Federal grants under the Airport Improvement Program. The FAA classifies airports as primary or non-primary. Primary airports are commercial service airports with more than 10,000 passenger enplanements in a prior reporting calendar year. Non-primary airports are the remainder of the NPIAS airports. Seven primary airports were evaluated during this study.

The area of pavements at these airports is enough to construct a two-lane highway stretching from Seattle, Washington to San Francisco, California – over 800 miles!






It is important to recognize that this is an aging pavement system. The area-weighted age of the system overall is 25 years, with the runways averaging 23 years, the taxiways 22 years, and the aprons 30 years. Since pavements are usually designed for a 20-year design life this is a concern.

<sup>3</sup> The following airports are not included in the analysis: Seattle-Tacoma International Airport, Bellingham International Airport, Spokane International Airport, and Tri-Cities Airport. Each of these facilities maintain their own *Airport Pavement Management System (APMS)*, and did not participate in the state study.

# METHODOLOGY

## Pavement Evaluation Procedure

The Pavement Condition Index (PCI) procedure, documented in FAA Advisory Circular (AC) 150/5380-6A, *Guidelines and Procedures for Maintenance of Airport Pavements*, and ASTM Standard D5340, *Standard Test Method for Airport Pavement Condition Index Surveys*, was used to assess the pavement condition at Washington airports. The PCI is used to indicate the condition of the operational surface of the pavement and, to some extent, the structural integrity of the pavement. During a PCI survey, distress type, distress severity, and distress quantity are recorded and analyzed. This information is used to calculate the PCI value of the section. The final calculated PCI value is a number from 0 to 100, with 100 representing a pavement in excellent condition and 0 representing a completely failed pavement. A PCI of 40 or less is indicative of a pavement needing complete replacement; those in the range of 40 to 70 often can be repaired with major rehabilitation such as an overlay; above that range preventive maintenance is often a viable alternative.

PCI	Representative Pavement Surface	Repair Alternative
96		Pavements with PCI values above a 60 to 70 often benefit from cost-effective preventive maintenance actions, such as crack sealing and surface treatments.
60		Pavements with a PCI in the range of 40 to 70 will typically require more expensive rehabilitation, such as an overlay.
5		Pavement allowed to deteriorate below a PCI of 40 may require costly reconstruction to restore it to operational condition.

## Typical Distress Types at Washington Airports

The types of distress identified during the PCI inspection provide insight into the cause of pavement deterioration. Understanding the cause of distress helps in selecting a rehabilitation alternative that corrects the cause and thus eliminates its recurrence. Following is a description of the most commonly observed distresses at the airports in Washington. The discussion is limited to asphalt cement concrete pavements since the majority of the Washington airport infrastructure consists of this type of pavement. See Appendix B for a list of appropriate maintenance activities to address each distress type.

### Longitudinal and Transverse Cracking



The predominant distress type found on the asphalt pavements at Washington airports is longitudinal and transverse (L&T) cracking. This distress can be caused by any of the following: 1) separation of pavement at paving lane joints, 2) shrinkage of AC pavement due to temperature differentials in older or brittle pavement, or 3) reflection cracking from underlying existing cracking in overlaid pavements. It is not a load related distress – however, repeated wheel loads can increase the deterioration rate of the pavement near the crack.

### Block Cracking



This distress, which is the natural progression from L&T cracking, generally appears over relatively large areas as a series of longitudinal and transverse cracks arranged in a pattern of square or rectangular blocks, with sizes varying from 2 to 10 feet square. It is caused by the shrinkage of the asphalt pavement over time and the repeated deformation (both expansion and contraction caused by daily temperature cycles). It is not a load related distress and its occurrence usually indicates that the pavement has significantly hardened (oxidized).

### Weathering and Raveling



As asphalt pavement ages and hardens, the asphalt binder and aggregate may begin to wear away. This process is called weathering and raveling. The wearing away of asphalt cement, or binder, is called weathering. Raveling occurs as the aggregate begins to dislodge and produce loose pieces of material.

### Depressions



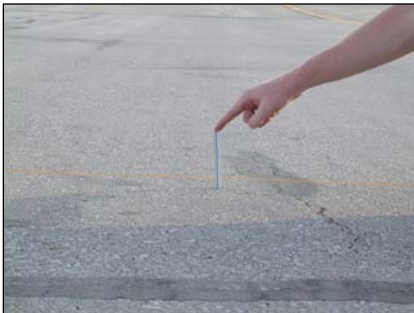
Depressions are localized pavement surface areas having elevations slightly lower than those of the surrounding pavement. Depressions may be caused by settlement of the underlying base layers or soils. Depressions are often found in areas where insufficient drainage capacity exists and soils are weakened due to water penetration or where underlying layers were not compacted enough during construction. Additionally, depressions can be built in during construction.

### Alligator (Fatigue) Cracking



Alligator (fatigue) cracking is a load-related distress. Alligator cracking is caused by excessive tensile strains at the bottom of the AC layer or stabilized asphalt base layer from repeated aircraft loadings. Once the crack initiates at the bottom, it then propagates toward the pavement surface with continued loadings. Alligator cracking typically shows up on the surface as a series of parallel cracks, which eventually interconnect to form a pattern resembling the skin of an alligator.

### Rutting



Rutting is characterized by surface depressions located in the wheel path. These depressions are typically caused by consolidation or lateral movement of the material in any pavement layer or a combination of pavement layers due to repeated traffic loadings.

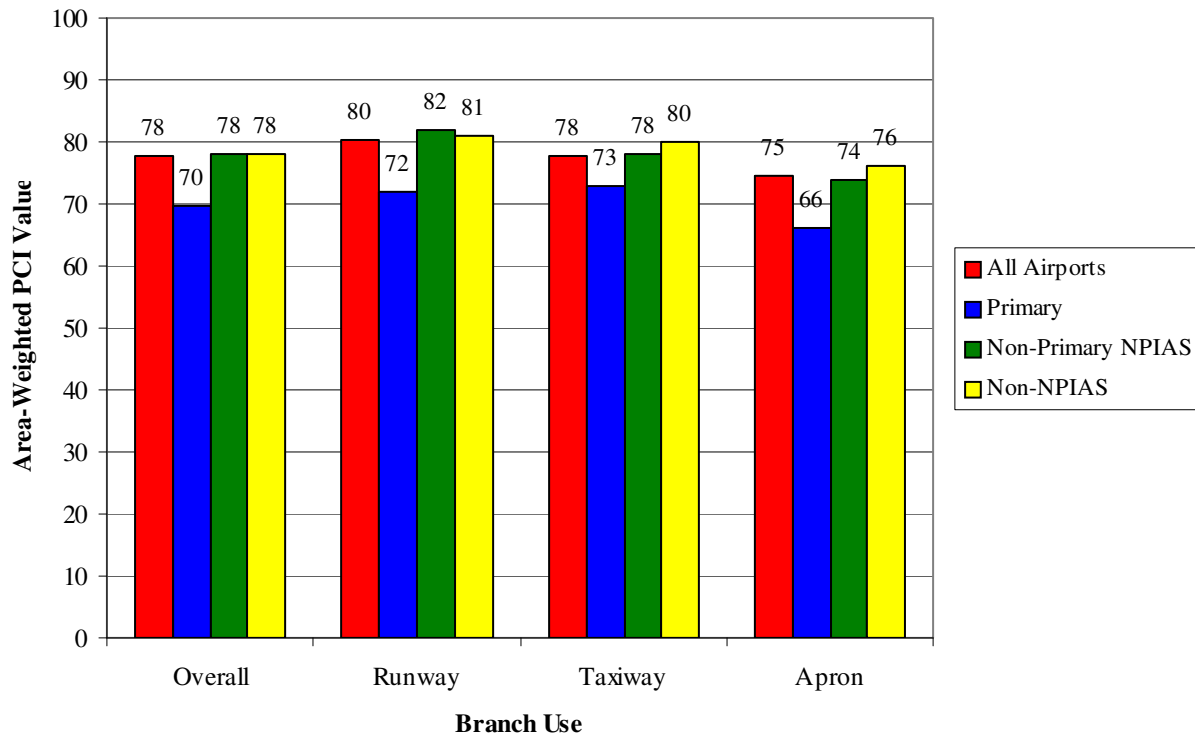
### Patching



Patching is identified as a distress because it is not an original design feature of the pavement structure.

## Overall Pavement Condition

The overall 2005 area-weighted condition of the 96 public use airports was a PCI of 76.7. This can be compared to the 2000 area-weighted PCI of 73.0 for 83 airports. The current existing performance measure for pavement condition is an overall airport PCI of 78 points or above.



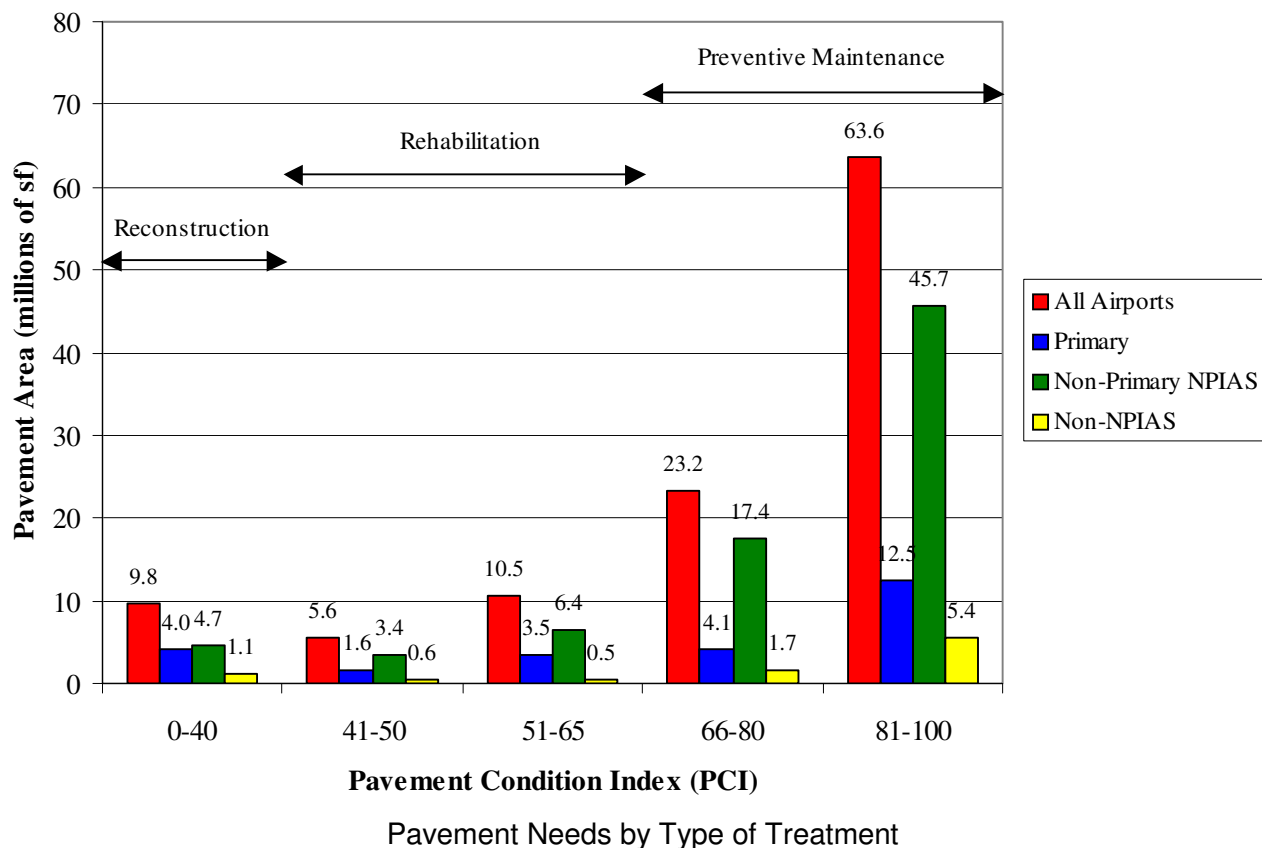
Pavement Condition by Use and by Classification

## PAVEMENT NEEDS ASSESSMENT

Many of Washington's airport pavements are at the condition level where timely improvements need to be performed to prevent the pavements from deteriorating to a point when very costly rehabilitation may be needed to keep them operational and safe. In assessing pavement needs, an analysis approach was used where a critical condition is to be maintained throughout the pavement system over the analysis period. Above the critical PCI, preventive maintenance is usually a cost-effective means of preserving the pavement infrastructure and prolonging pavement life. Below the critical PCI, more major rehabilitation is typically needed. The critical PCI levels were established by WSDOT Aviation and the FAA based upon the pavement use (runway, taxiway, or apron), load classification (less than or greater than 60,000#), and surface type (asphalt cement concrete or portland cement concrete).

**Approximately 8.7 percent of the pavement infrastructure at the 96 project airports is currently in need of reconstruction and approximately 14.3 percent is in need of rehabilitation.** The remainder of the system is at the condition level where preventive maintenance actions such as crack sealing, joint sealing, and surface treatments are most cost-effective. However, the pavement system is aging and many of the pavements that would benefit now from preventive maintenance will soon deteriorate to a point where rehabilitation will be required.

The following figure shows which types of work should be performed on the Washington airport pavements depending on their condition. Preventive maintenance refers to activities such as crack sealing, joint resealing, and surface treatments. Rehabilitation includes overlays and concrete restoration. Reconstruction involves the replacement of pavement.



# PAVEMENT REHABILITATION PROGRAM

## Analysis Process

The MicroPAVER APMS software (non-proprietary pavement management software developed by the U.S. Army Corps of Engineers through funding from the FAA and other agencies) was used to develop a maintenance and rehabilitation (M&R) program for the Washington airports. The analysis was run through 2012 and an inflation factor of 3 percent was applied. For each year of the analysis, the future condition of the pavements was estimated and a determination was made as to whether preventive maintenance or major rehabilitation/reconstruction was the appropriate and most cost-effective strategy. After the treatment was selected for the pavement section, its cost was calculated using unit cost developed by CH2M HILL for this project and provided in Appendix B.

*Seattle-Tacoma International, Bellingham International, Spokane International, and Tri-Cities Airports were not evaluated during this project; however, it is important to note that these airports will need funding in addition to the needs cited in this report.*

## Analysis Results

### No Funding

At one extreme end of the scale, if no funding is provided for pavement maintenance or rehabilitation the pavement system of the 96 airports will experience a slow but steady decline in condition, with an anticipated PCI of 68 by 2012. This drop is important because as the average PCI value drops the number of pavement sections that go from the preventive maintenance category to the much more expensive major rehabilitation category increases significantly. Preventative maintenance can be conducted to extend the life of pavement facilities, but cannot eliminate overall system deterioration.

### Unlimited Funding

On the other hand, if all maintenance and rehabilitation projects were to be funded, an approximate total of **\$388 million would be needed over the next 7 years**. This can be further broken down as follows:

1. \$194.9 million for primary NPIAS airports.
2. \$176.8 million for non-primary NPIAS airports.
3. \$16.8 million for non-NPIAS airports.

Funding at this level would raise the system average PCI to above 78 by 2012. Appendix C summarizes the funding needs through 2012 by airport.

### Current Level of Funding

Unfortunately, only \$4.5 million annually is currently anticipated for the non-primary airports — \$3.5 million of FAA funding and \$1 million of WSDOT funding (\$200,000 for NPIAS airports and \$800,000 for non-NPIAS airports eligible for state funding). This would result in \$31.5 million of projects being funded, leaving a backlog of over \$163 million for the non-primary airports.

Under this funding scenario, the area-weighted PCI for the non-primary airports would drop to 73 by 2012.

### Funding Needs by State Airport Classification

WSDOT Aviation's Long-Term Air Transportation Study (LATS) introduces a classification system that is used to describe the role each airport plays in the state aviation system. The classification scheme is similar to that used by the FAA, but provides a greater level of detail about airports identified as "General Aviation" in the federal system. The state classification system includes the following categories:

#### *Commercial Service Airports*

Commercial airports provide scheduled air carrier and/or commuter service to in-state, domestic, and (in some cases) international destinations. These airports have expansive geographic service areas and are located in Washington's largest population centers. The state's commercial service airports are shown below.

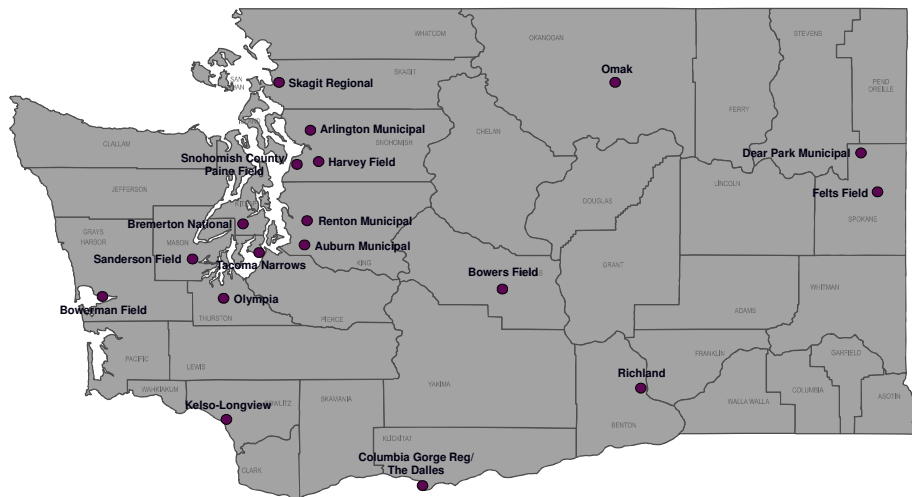


*Note: The following airports maintain individual pavement management programs and were not included in the analysis: Seattle-Tacoma International, Bellingham International, Spokane International, and Tri-Cities.*

**The total funding need through 2012 for 10 Commercial Service airports is \$240 million.**

#### *Regional Service Airports*

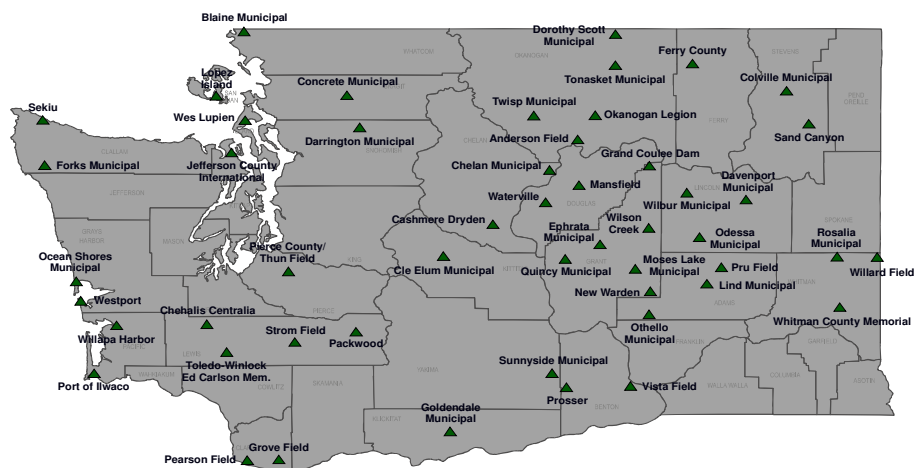
Regional service airports serve a large-to-medium market area. They may include air cargo service and reliever airports. They are capable of accommodating high activity levels, nearly all types of general aviation aircraft, including business jets, and support a range of facilities and services. The state's regional service airports are shown below.



**The total funding need through 2012 for 17 Regional Service airports is \$90 million.**

### *Local Community Service Airports*

Local Community Service airports are generally medium-to-low activity facilities located in small or mid-sized communities. Some may support air cargo service. These airports may have limited general aviation facilities and services. The state's local community service airports are shown below.

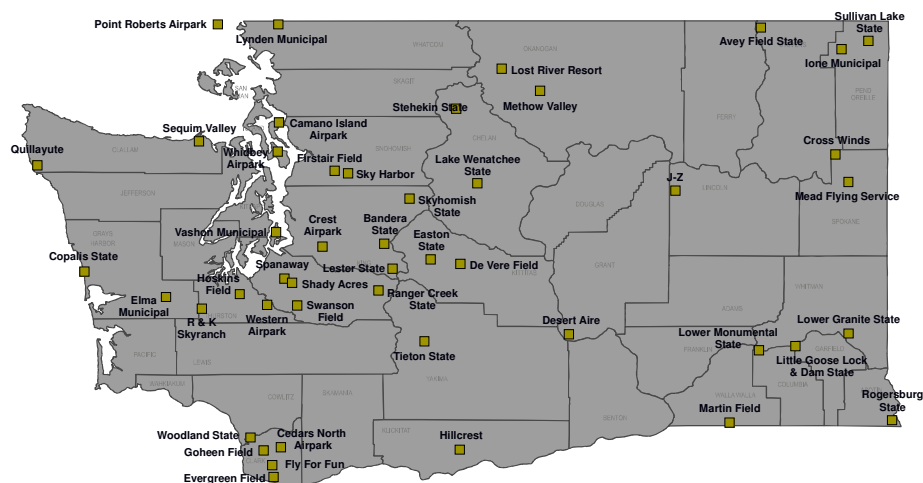


*Note: Airports without paved runways were not included in the analysis.*

**The total funding need through 2012 for 51 Local Community Service airports is \$48 million.** Airports within this classification were further segregated into airports with 10 or more based aircraft and those with fewer than 10 based aircraft to assist in identifying the appropriate level of facility needs. The funding needs for airports with ten or more based aircraft is \$39.5 million; the need for airports with fewer than ten based aircraft is \$8.6 million.

## *Recreation or Remote*

These are airport facilities that serve recreation communities or leisure destinations as well as backcountry locations. These airports may also be strategically located for emergency, medical, and firefighting access in mountainous or other remote areas. The state's recreation or remote airports are shown below.

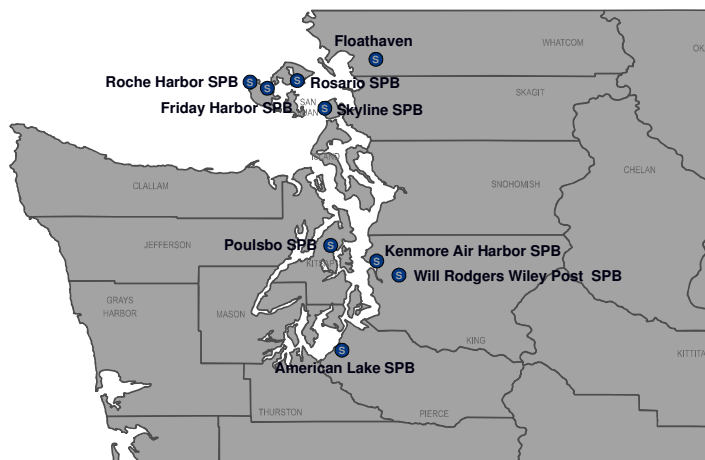


*Note: Airports without paved runways were not included in the analysis.*

**The total funding need through 2012 for 18 Recreation or Remote airports is \$10 million.**

## *Seaplane Base*

Seaplane bases serve amphibious and float-equipped aircraft and may have some upland facilities. *Seaplane bases do not have paved runways and are therefore excluded from this analysis.* Washington State's seaplane bases are shown below.



## DISCUSSION & RECOMMENDATIONS

WSDOT Aviation, through funding from the FAA, established and maintains a statewide APMS for selected Washington airports in the WSASP and the FAA NPIAS. This APMS permits WSDOT Aviation to proactively manage the maintenance and rehabilitation of almost 113 million square yards of airfield pavement in the most fiscally responsible manner possible.

It is important to maintain pavements above critical condition levels for two reasons: 1) safety and 2) it is much more costly to repair a pavement once it has been allowed to deteriorate below a certain condition level. An analysis of the PCI data collected in 2005 revealed that 23 percent of the Washington pavement infrastructure has deteriorated to a point where costly rehabilitation or even reconstruction is needed. The remainder of the system is at the condition level where preventive maintenance actions such as crack sealing, joint sealing, and surface treatments will preserve and prolong the pavement infrastructure. However, if this work is delayed, more costly work will be needed in the future.

An analysis of pavement conditions revealed a total system need of over \$388 million through 2012; of that, almost \$194 million is for the non-primary airports. That represents a total unfunded need of \$163 million for the non-primary airports alone during that same period. Needs were also identified by state classifications as proposed in the Long-Term Air Transportation Study; that analysis revealed the following: \$240 million for 10 Commercial Service airports; \$90 million for 17 Regional Service airports; \$48 million for 51 Local Community Service airports; and \$10 million for 18 Recreation or Remote airports.

The following are recommendations for physical improvement strategies and policy changes to address the significant unfunded need:

1. Preventive maintenance activities (crack sealing, surface treatments, etc.) are the key to cost-effectively prolonging the life of a pavement system. Therefore, it is recommended that pavement preventive maintenance requirements be added to the grant program eligibility criteria.
2. Since there are insufficient funds available to complete all identified pavement projects, it is important to maximize the effectiveness of the funds that are made available. Therefore, it is recommended that the state classification system be used to target investments in the pavement infrastructure. Commercial and regional airports should receive higher priority in receiving funding than local community airports with less than 10 based aircraft.
3. It is recommended that additional funding be pursued. Without some increase in funding, numbers 1 and 2 in this list will retard the rate of deterioration of the pavement system but will not stop it.
4. It is recommended that the existing performance measures for statewide pavement condition be evaluated and modified as needed. The existing performance measure for airport pavements is that the overall airport system should be maintained at or above an average PCI of 78 points. This approach has two major disadvantages. First, the averaging process gives equal weighting to all pavement areas – whether they are critical from a safety viewpoint or operationally. For example, a little used apron at a local community airport under the current system weights equally with a primary runway at a commercial airport. Second, the use of an overall average PCI value can mask

significant deficiencies in the system. While the overall PCI value may be satisfactory, there could be critical pavements that are below desirable condition levels.

Therefore, it may be more appropriate to adopt measures that place an emphasis on condition by airport classification, and measures that emphasize runway condition versus other facilities. In other words, rather than have a single performance goal for the entire system, different performance goals would be established based on the classification of the airport and the use of the pavement (runway, taxiway, or apron).

Further, in addition to monitoring the average PCI of the pavement system it is recommended that consideration be given to also establishing performance measures based on minimum allowable condition levels. For example, primary runways at commercial and regional airports should not be allowed to deteriorate below an established PCI level. This approach would focus limited funding on the critical pavements from both a safety and an economic viewpoint.

5. The current performance measures in the statewide system encompass a variety of facility issues such as lighting, runway length, navigation and weather reporting systems. Since pavements represent a very large capital investment at the airports and their condition is so critical to safe operations, it is strongly recommended that pavement standards be incorporated into the statewide system plan performance measures.

**APPENDIX A**  
**AIRPORT CLASSIFICATION AND CONDITION INFORMATION**

Airport classification and condition information.

<b>Airport Name</b>	<b>Associated City</b>	<b>State Classification<sup>1</sup></b>	<b>FAA Classification</b>	<b>NPIAS</b>	<b>Overall PCI</b>	<b>PCI of Primary Runway</b>
Anacortes Airport	Anacortes	Commercial Service	General Aviation	Yes	86	100
Anderson Field	Brewster	Local Community (10+)	General Aviation	Yes	100	100
Arlington Municipal Airport	Arlington	Regional Service	General Aviation	Yes	86	96
Auburn Municipal	Auburn	Regional Service	Reliever	Yes	78	100
Blaine Municipal Airport	Blaine	Local Community (10+)	General Aviation	Yes	72	99
Boeing Field	Seattle	Commercial Service	Primary	Yes	78	65
Bowerman Field	Hoquiam	Regional Service	General Aviation	Yes	90	92
Bowers Field	Ellensburg	Regional Service	General Aviation	Yes	68	70
Bremerton National Airport	Bremerton	Regional Service	General Aviation	Yes	82	73
Cashmere-Dryden Airport	Cashmere	Local Community (10+)	General Aviation	Yes	69	85
Chehalis - Centralia Airport	Chehalis	Local Community (10+)	General Aviation	Yes	80	85
Chelan Municipal Airport	Chelan	Local Community (10+)	General Aviation	Yes	80	76
Cle Elum Municipal Airport	Cle Elum	Local Community (<10)	General Aviation	Yes	42	40
Colville Municipal Airport	Colville	Local Community (10+)	General Aviation	No	88	93
Concrete Municipal Airport	Concrete	Local Community (10+)	General Aviation	No	95	95
Crest Airpark	Kent	Recreation or Remote	General Aviation	No	65	72
Darrington Municipal Airport	Darrinton	Local Community (<10)	General Aviation	No	96	97
Davenport Airport	Davenport	Local Community (10+)	General Aviation	Yes	99	99
De Vere Field	Cle Elum	Recreation or Remote	General Aviation	No	43	44
Deer Park Municipal Airport	Deer Park	Regional Service	General Aviation	Yes	86	100
Desert Aire	Mattawa	Recreation or Remote	General Aviation	No	90	94
Dorothy Scott Airport	Oroville	Local Community (10+)	General Aviation	Yes	76	94
Elma Municipal Airport	Elma	Recreation or Remote	General Aviation	No	63	77
Ephrata Municipal Airport	Ephrata	Local Community (10+)	General Aviation	Yes	64	58
Felts Field	Spokane	Regional Service	General Aviation	Yes	78	91
Ferry County Airport	Republic	Local Community (<10)	General Aviation	No	86	85
Firstair Field	Monroe	Recreation or Remote	General Aviation	No	43	42
Forks Municipal Airport	Forks	Local Community (<10)	General Aviation	No	75	77
Friday Harbor Airport	Friday Harbor	Commercial Service	Primary	Yes	89	100

Airport classification and condition information (continued).

<b>Airport Name</b>	<b>Associated City</b>	<b>State Classification<sup>1</sup></b>	<b>FAA Classification</b>	<b>NPIAS</b>	<b>Overall PCI</b>	<b>PCI of Primary Runway</b>
Goldendale Hornibrook Airport (Hornibrook Field)	Goldendale	Local Community (10+)	General Aviation	No	94	100
Grand Coulee Dam Airport	Electric City	Local Community (<10)	General Aviation	Yes	100	100
Grant County International Airport	Moses Lake	Commercial Service	Commercial	Yes	80	89
Grove Field	Camas/Washougal	Local Community (10+)	General Aviation	Yes	89	100
Harvey Field	Snohomish	Regional Service	Reliever	Yes	69	78
Ione Municipal Airport	Ione	Recreation or Remote	General Aviation	Yes	95	100
Jefferson County	Port Townsend	Local Community (10+)	General Aviation	Yes	93	91
Kelso-Longview Airport (Molt Taylor Field)	Kelso	Regional Service	General Aviation	Yes	88	84
Lind Municipal Airport	Lind	Local Community (<10)	General Aviation	No	100	100
Lopez Island Airport	Lopez	Local Community (10+)	Commercial	Yes	95	100
Lynden Municipal Airport	Lynden	Recreation or Remote	General Aviation	No	92	87
Mansfield Airport	Mansfield	Local Community (<10)	General Aviation	No	63	86
Martin Airfield	Walla Walla	Recreation or Remote	General Aviation	No	53	67
Mead Flying Service	Spokane	Recreation or Remote	General Aviation	No	76	75
Methow Valley State Airport	Winthrop	Recreation or Remote	General Aviation	Yes	84	83
Moses Lake Municipal Airport	Moses Lake	Local Community (10+)	General Aviation	No	79	74
New Warden Airport	Warden	Local Community (<10)	General Aviation	No	79	75
Ocean Shores Municipal	Ocean Shores	Local Community (<10)	General Aviation	Yes	98	99
Odessa Municipal Airport	Odessa	Local Community (10+)	General Aviation	Yes	96	94
Okanogan Legion Airport	Okanogan	Local Community (10+)	General Aviation	No	90	87
Olympia Municipal Airport	Olympia	Regional Service	General Aviation	Yes	79	84
Omak Municipal	Omak	Regional Service	General Aviation	Yes	80	78
Orcas Island Airport	Eastsound	Commercial Service	General Aviation	Yes	87	85
Othello Municipal	Othello	Local Community (10+)	General Aviation	Yes	48	50
Packwood Airport	Packwood	Local Community (<10)	General Aviation	Yes	77	77
Pangborn Memorial Airport	Wenatchee	Commercial Service	Primary	Yes	79	98
Pearson Airpark	Vancouver	Local Community (10+)	General Aviation	Yes	93	97
Pierce County - Thun Field	Puyallup	Local Community (10+)	General Aviation	Yes	87	79

Airport classification and condition information (continued).

<b>Airport Name</b>	<b>Associated City</b>	<b>State Classification<sup>1</sup></b>	<b>FAA Classification</b>	<b>NPIAS</b>	<b>Overall PCI</b>	<b>PCI of Primary Runway</b>
Port of Ilwaco Airport	Ilwaco	Local Community (<10)	General Aviation	No	100	100
Port of Whitman Business Center	Colfax	Local Community (10+)	General Aviation	Yes	73	100
Prosser Airport	Prosser	Local Community (10+)	General Aviation	Yes	93	88
Pru Field	Ritzville	Local Community (<10)	General Aviation	Yes	92	88
Pullman-Moscow Regional Airport	Pullman/Moscow	Commercial Service	Primary	Yes	86	80
Quillayute State Airport	Forks	Recreation or Remote	General Aviation	Yes	70	79
Quincy Municipal Airport	Quincy	Local Community (<10)	General Aviation	No	84	100
Ranger Creek State Airport	Greenwater	Recreation or Remote	General Aviation	No	65	65
Renton Municipal Airport	Renton	Regional Service	Reliever	Yes	89	87
Richland Airport	Richland	Regional Service	General Aviation	Yes	83	65
Rosalia Municipal Airport	Rosalia	Local Community (10+)	General Aviation	Yes	50	53
Sand Canyon Airport	Chewelah	Local Community (10+)	General Aviation	No	79	95
Sanderson Field	Shelton	Regional Service	General Aviation	Yes	89	100
Sekiu Airport	Port Angeles	Local Community (<10)	General Aviation	No	20	19
Sequim Valley Airport	Sequim	Recreation or Remote	General Aviation	No	87	98
Skagit Regional Airport	Burlington/Mount Vernon	Regional Service	General Aviation	Yes	81	84
Snohomish County Airport (Paine Field)	Everett	Regional Service	Reliever	Yes	80	93
Spanaway Airport	Spanaway	Recreation or Remote	General Aviation	No	51	57
Strom Field	Morton	Local Community (<10)	General Aviation	No	67	77
Sunnyside Municipal Airport	Sunnyside	Local Community (10+)	General Aviation	Yes	84	96
Swanson Field	Eatonville	Recreation or Remote	General Aviation	No	100	100
Tacoma Narrows Airport	Tacoma	Regional Service	General Aviation	Yes	81	84
Toledo-Winlock Ed Carlson Memorial Field	Toledo	Local Community (10+)	General Aviation	Yes	83	100
Tonasket Municipal Airport	Tonasket	Local Community (10+)	General Aviation	No	86	90
Twisp Municipal Airport	Twisp	Local Community (<10)	General Aviation	No	52	41
Vista Field	Kennewick	Local Community (<10)	General Aviation	No	86	78
Walla Walla Regional Airport	Walla Walla	Commercial Service	Primary	Yes	40	100
Waterville Airport	Waterville	Local Community (10+)	General Aviation	No	79	83

Airport classification and condition information (continued).

<b>Airport Name</b>	<b>Associated City</b>	<b>State Classification<sup>1</sup></b>	<b>FAA Classification</b>	<b>NPIAS</b>	<b>Overall PCI</b>	<b>PCI of Primary Runway</b>
Wes Lupien Airport	Oak Harbor	Local Community (<10)	General Aviation	No	25	13
Western Airpark	McKenna	Recreation or Remote	General Aviation	No	96	93
Westport Airport	Westport	Local Community (<10)	General Aviation	No	85	81
Whidbey Airpark	Langley	Recreation or Remote	General Aviation	Yes	99	99
Wilbur Municipal Airport	Wilbur	Local Community (10+)	General Aviation	Yes	91	96
Willapa Harbor Airport	South Bend/ Raymond	Local Community (<10)	General Aviation	No	88	100
Willard Field	Tekoa	Local Community (10+)	General Aviation	No	95	96
William R. Fairchild International Airport	Port Angeles	Commercial Service	Primary	Yes	75	90
Wilson Creek Airport	Wilson Creek	Local Community (<10)	General Aviation	No	93	89
Woodland State Airport	Woodland State	Recreation or Remote	General Aviation	No	46	46
Yakima Air Terminal	Yakima	Commercial Service	Primary	Yes	76	96

<sup>1</sup>Local Community (10+) – Local Community Airport with 10 or more based aircraft.

Local Community (<10) – Local Community Airport with fewer than 10 based aircraft.

**APPENDIX B**  
**UNIT COST AND WORK POLICY INFORMATION**

Preventive maintenance policies for asphalt-surfaced pavements.

<b>Distress Type</b>	<b>Severity Level</b>	<b>Maintenance Action</b>
Alligator Cracking	Low	Monitor
	Medium	Full Depth AC Patch
	High	Full Depth AC Patch
Bleeding	N/A	Monitor
Block Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal
Corrugation	Low	Monitor
	Medium	Monitor
	High	Full Depth AC Patch
Depression	Low	Monitor
	Medium	Monitor
	High	Full Depth AC Patch
Jet Blast	N/A	Partial Depth AC Patch
Joint Reflection Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal
Longitudinal and Transverse Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal
Oil Spillage	N/A	Partial Depth AC Patch
Patching	Low	Monitor
	Medium	Monitor
	High	Full Depth AC Patch
Polished Aggregate	N/A	Monitor
Raveling and Weathering	Low	Monitor
	Medium	Monitor
	High	Partial Depth AC Patch
Rutting	Low	Monitor
	Medium	Monitor
	High	Full Depth AC Patch
Shoving	Low	Monitor
	Medium	Full Depth AC Patch
	High	Full Depth AC Patch
Slippage Cracking	N/A	Full Depth AC Patch
Swelling	Low	Monitor
	Medium	Monitor
	High	Full Depth Patch

Preventive maintenance policies for portland cement concrete pavements.

<b>Distress Type</b>	<b>Severity Level</b>	<b>Maintenance Action</b>
Blow-Up	Low	Slab Replacement
	Medium	Slab Replacement
	High	Slab Replacement
Corner Break	Low	Monitor
	Medium	Crack Seal
	High	Full Depth PCC Patch
Cracks	Low	Monitor
	Medium	Crack Seal
	High	Slab Replacement
Durability Cracking	Low	Monitor
	Medium	Full Depth PCC Patch
	High	Slab Replacement
Joint Seal Damage	Low	Monitor
	Medium	Joint Seal
	High	Joint Seal
Patching	Low	Monitor
	Medium	Monitor
	High	Full Depth PCC Patch
Popouts	N/A	Monitor
Pumping	N/A	Monitor
Scaling	Low	Monitor
	Medium	Slab Replacement
	High	Slab Replacement
Settlement/ Faulting	Low	Monitor
	Medium	Monitor
	High	Slab Replacement
Shattered Slab	Low	Monitor
	Medium	Slab Replacement
	High	Slab Replacement
Shrinkage	N/A	Monitor
Spalling (Joint and Corner)	Low	Monitor
	Medium	Partial Depth PCC Patch
	High	Partial Depth PCC Patch

2005 preventive maintenance unit costs for asphalt-surfaced pavements.

Maintenance Action	2005 Unit Costs (\$/sf or lf)							
	<12,500#		12,500-60,000#		60,000-100,000#		>100,000#	
	West	East	West	East	West	East	West	East
Full Depth AC Patch (sf)	6.40	7.00	13.20	12.80	14.40	14.10	14.10	14.50
Partial Depth AC Patch (sf)	4.30	3.70	4.30	3.70	4.30	3.70	4.30	3.70
Crack Sealing (lf)	8.20	7.00	8.20	7.00	8.20	7.00	8.20	7.00

2005 preventive maintenance unit costs for portland cement concrete pavements.

Maintenance Action	2005 Unit Costs (\$/sf or lf)							
	<12,500#		12,500-60,000#		60,000-100,000#		>100,000#	
	West	East	West	East	West	East	West	East
Slab Replacement (sf)	18.20	16.80	33.70	31.80	39.60	35.90	49.90	42.40
Full Depth Patch (sf)	17.20	15.90	32.70	30.90	38.60	35.10	49.10	41.80
Partial Depth Patch (sf)	22.20	18.90	22.20	18.90	22.20	18.90	22.20	18.90
Crack Sealing (lf)	8.20	7.00	8.20	7.00	8.20	7.00	8.20	7.00
Joint Seal (bituminous) (lf)	8.20	7.00	8.20	7.00	8.20	7.00	8.20	7.00

2005 unit costs for major rehabilitation activities on asphalt surfaced pavements.

PCI	2005 Unit Costs (\$/sf)							
	<12,500#		12,500-60,000#		60,000-100,000#		>100,000#	
	West	East	West	East	West	East	West	East
>40 <sup>1</sup>	3.40	2.90	4.10	3.50	4.10	3.50	5.00	4.30
<40 <sup>2</sup>	5.10	5.70	10.60	10.20	11.40	11.10	10.80	11.10

<sup>1</sup>PCI > 40 – asphalt overlay.

<sup>2</sup>PCI < 40 – asphalt reconstruction.

2005 unit costs for major rehabilitation activities on portland cement concrete pavements.

PCI	2005 Unit Costs (\$/sf)							
	<12,500#		12,500-60,000#		60,000-100,000#		>100,000#	
	West	East	West	East	West	East	West	East
>40 <sup>1</sup>	3.40	2.90	4.10	3.50	4.10	3.50	5.00	4.30
<40 <sup>2</sup>	9.20	8.90	23.30	21.30	25.80	23.30	42.00	36.90

<sup>1</sup>PCI > 40 – asphalt overlay.

<sup>2</sup>PCI < 40 – portland cement concrete reconstruction.

2005 unit costs for surface treatments.

Treatment	2005 Unit Costs (\$/sf)							
	<12,500#		12,500-60,000#		60,000-100,000#		>100,000#	
	West	East	West	East	West	East	West	East
Fog Seal	0.30	0.20	0.30	0.20	0.30	0.20	0.30	0.20
Slurry Seal	1.40	1.20	1.40	1.20	1.40	1.20	1.40	1.20

**APPENDIX C**  
**MAJOR REHABILITATION AND GLOBAL MAINTENANCE**  
**FUNDING NEEDS THROUGH 2012**

Major rehabilitation and global maintenance funding needs through 2012.

*Note: The following airports are not included: Seattle-Tacoma International, Bellingham International, Spokane International, and Tri-Cities.*

State Classification	FAA Classification	NPIAS	Airport Name	Funding Needs by Use			Total Funding Needs
				Runway	Taxiway	Apron	
Washington Commercial Service Airports							
Commercial Service	General Aviation	Yes	Anacortes Airport	\$0	\$248,714	\$0	\$248,714
	Primary	Yes	Boeing Field	\$14,368,753	\$7,291,745	\$1,542,748	\$23,203,246
	Primary	Yes	Friday Harbor Airport	\$0	\$98,087	\$176,847	\$274,933
	Commercial	Yes	Grant County International Airport	\$3,347,778	\$8,214,197	\$33,165,749	\$44,727,724
	General Aviation	Yes	Orcas Island Airport	\$0	\$0	\$0	\$0
	Primary	Yes	Pangborn Memorial Airport	\$2,783,493	\$1,421,686	\$1,604,194	\$5,809,373
	Primary	Yes	Pullman-Moscow Regional Airport	\$4,695,756	\$0	\$584,678	\$5,280,434
	Primary	Yes	Walla Walla Regional Airport	\$66,519,566	\$6,469,616	\$57,449,116	\$130,438,298
	Primary	Yes	William R. Fairchild International Airport	\$6,506,530	\$3,909,624	\$3,293,788	\$13,709,942
	Primary	Yes	Yakima Air Terminal	\$8,502,626	\$4,090,266	\$3,556,043	\$16,148,934
Total Estimated Cost				\$106,724,503	\$31,743,934	\$101,373,162	\$239,841,598
Washington Regional Service Airports							
Regional Service	General Aviation	Yes	Arlington Municipal Airport	\$0	\$4,094,252	\$772,299	\$4,866,551
	Reliever	Yes	Auburn Municipal Airport	\$0	\$1,422,952	\$674,416	\$2,097,367
	General Aviation	Yes	Bowerman Field	\$0	\$280,229	\$738,137	\$1,018,366
	General Aviation	Yes	Bowers Field	\$8,235,491	\$259,616	\$487,705	\$8,982,813
	General Aviation	Yes	Bremerton National Airport	\$5,311,674	\$179,926	\$412,854	\$5,904,453
	General Aviation	Yes	Deer Park Municipal Airport	\$0	\$1,499,707	\$666,165	\$2,165,872
	General Aviation	Yes	Felts Field	\$0	\$641,808	\$4,848,012	\$5,489,820
	Reliever	Yes	Harvey Field	\$0	\$801,649	\$143,723	\$945,372
	General Aviation	Yes	Kelso-Longview Airport (Molt Taylor Field)	\$0	\$97,472	\$241,181	\$338,653

Major rehabilitation and global maintenance funding needs through 2012 (continued).

State Classification	FAA Classification	NPIAS	Airport Name	Funding Needs by Use			Total Funding Needs
				Runway	Taxiway	Apron	
Regional Service	General Aviation	Yes	Olympia Municipal Airport	\$3,018,195	\$6,050,228	\$2,720,437	\$11,788,860
	General Aviation	Yes	Omak Municipal Airport	\$1,592,321	\$235,835	\$0	\$1,828,156
	Reliever	Yes	Renton Municipal Airport	\$712,023	\$665,304	\$0	\$1,377,327
	General Aviation	Yes	Richland Airport	\$2,697,804	\$446,779	\$97,405	\$3,241,989
	General Aviation	Yes	Sanderson Field	\$0	\$1,448,564	\$149,008	\$1,597,572
	General Aviation	Yes	Skagit Regional Airport	\$811,291	\$3,832,325	\$348,419	\$4,992,035
	Reliever	Yes	Snohomish County Airport (Paine Field)	\$1,451,028	\$8,426,330	\$14,133,411	\$24,010,768
	General Aviation	Yes	Tacoma-Narrows Airport	\$4,099,365	\$2,896,927	\$2,600,404	\$9,596,697
<b>Total Estimated Cost</b>				<b>\$27,929,193</b>	<b>\$33,279,902</b>	<b>\$29,033,576</b>	<b>\$90,242,670</b>
<b>Washington Local Community (With 10 or More Based Aircraft) Airports</b>							
Local Community (10+)	General Aviation	Yes	Anderson Field	\$0	\$0	\$0	\$0
	General Aviation	Yes	Blaine Municipal Airport	\$0	\$372,831	\$28,839	\$401,670
	General Aviation	Yes	Cashmere-Dryden Airport	\$0	\$250,071	\$0	\$250,071
	General Aviation	Yes	Chehalis-Centralia Airport	\$0	\$381,454	\$1,134,408	\$1,515,861
	General Aviation	Yes	Chelan Municipal Airport	\$36,919	\$21,041	\$147,513	\$205,473
	General Aviation	No	Colville Municipal Airport	\$25,780	\$93,541	\$67,503	\$186,824
	General Aviation	No	Concrete Municipal Airport	\$103,285	\$0	\$22,557	\$125,842
	General Aviation	Yes	Davenport Airport	\$0	\$0	\$0	\$0
	General Aviation	Yes	Dorothy Scott Airport	\$0	\$240,923	\$180,136	\$421,059
	General Aviation	Yes	Ephrata Municipal Airport	\$11,753,914	\$4,831,965	\$10,340,857	\$26,926,735
	General Aviation	No	Goldendale Hornibrook Airport (Hornibrook Field)	\$0	\$14,639	\$102,287	\$116,926
	General Aviation	Yes	Grove Field	\$0	\$117,985	\$48,868	\$166,854
	General Aviation	Yes	Jefferson County	\$0	\$71,695	\$0	\$71,695
	Commercial	Yes	Lopez Island Airport	\$0	\$16,415	\$0	\$16,415

Major rehabilitation and global maintenance funding needs through 2012 (continued).

State Classification	FAA Classification	NPIAS	Airport Name	Funding Needs by Use			Total Funding Needs
				Runway	Taxiway	Apron	
Local Community (10+)	General Aviation	No	Moses Lake Municipal Airport	\$373,837	\$162,738	\$42,807	\$579,382
	General Aviation	Yes	Odessa Municipal Airport	\$0	\$0	\$0	\$0
	General Aviation	No	Okanogan Legion Airport	\$22,863	\$289	\$14,319	\$37,471
	General Aviation	Yes	Othello Municipal Airport	\$581,479	\$645,852	\$101,855	\$1,329,186
	General Aviation	Yes	Pearson Airpark	\$0	\$79,267	\$51,590	\$130,857
	General Aviation	Yes	Pierce County-Thun Field	\$0	\$0	\$0	\$0
	General Aviation	Yes	Port of Whitman Business Center	\$0	\$680,526	\$319,663	\$1,000,189
	General Aviation	Yes	Prosser Airport	\$0	\$0	\$0	\$0
	General Aviation	Yes	Rosalia Municipal Airport	\$756,496	\$421,604	\$392,217	\$1,570,317
	General Aviation	No	Sand Canyon Airport	\$72,520	\$339,398	\$12,306	\$424,224
	General Aviation	Yes	Sunnyside Municipal Airport	\$0	\$233,922	\$255,858	\$489,780
	General Aviation	Yes	Toledo-Winlock Ed Carlson Memorial Field	\$0	\$1,869,546	\$539,872	\$2,409,418
	General Aviation	No	Tonasket Municipal Airport	\$0	\$118,292	\$4,615	\$122,907
	General Aviation	No	Waterville Airport	\$411,652	\$104,715	\$218,922	\$735,290
	General Aviation	Yes	Wilbur Municipal Airport	\$0	\$0	\$232,701	\$232,701
	General Aviation	No	Willard Field	\$39,759	\$1,130	\$6,982	\$47,871
<b>Total Estimated Cost</b>				<b>\$14,178,505</b>	<b>\$11,069,838</b>	<b>\$14,266,675</b>	<b>\$39,515,018</b>
<b>Washington Local Community (With Fewer than 10 Based Aircraft) Airports</b>							
Local Community (<10)	General Aviation	Yes	Clem Elum Municipal Airport	\$619,226	\$77,373	\$35,387	\$731,986
	General Aviation	No	Darrington Municipal Airport	\$0	\$38,881	\$0	\$38,881
	General Aviation	No	Ferry County Airport	\$45,632	\$1,960	\$0	\$47,592
	General Aviation	No	Forks Municipal Airport	\$569,488	\$335,811	\$121,310	\$1,026,610
	General Aviation	Yes	Grand Coulee Dam Airport	\$0	\$0	\$0	\$0
	General Aviation	No	Lind Municipal Airport	\$0	\$0	\$0	\$0

Major rehabilitation and global maintenance funding needs through 2012 (continued).

State Classification	FAA Classification	NPIAS	Airport Name	Funding Needs by Use			Total Funding Needs
				Runway	Taxiway	Apron	
Local Community (<10)	General Aviation	No	Mansfield Airport	\$146,120	\$12,213	\$481,445	\$639,778
	General Aviation	No	New Warden Airport	\$344,580	\$0	\$0	\$344,580
	General Aviation	Yes	Ocean Shores Municipal Airport	\$0	\$0	\$0	\$0
	General Aviation	Yes	Packwood Airport	\$0	\$0	\$4,361	\$4,361
	General Aviation	No	Port of Ilwaco Airport	\$0	\$0	\$0	\$0
	General Aviation	Yes	Pru Field	\$0	\$0	\$0	\$0
	General Aviation	No	Quincy Municipal Airport	\$0	\$0	\$382,481	\$382,481
	General Aviation	No	Sekiu Airport	\$1,133,388	\$0	\$366,191	\$1,499,579
	General Aviation	No	Strom Field	\$259,708	\$26,104	\$72,798	\$358,610
	General Aviation	No	Twisp Municipal Airport	\$695,686	\$316,991	\$7,550	\$1,020,227
	General Aviation	No	Vista Field	\$763,848	\$44,314	\$17,541	\$825,703
	General Aviation	No	Wes Lupien Airport <sup>1</sup>	\$460,311	\$0	\$266,601	\$726,913
	General Aviation	No	Westport Airport	\$355,930	\$36,705	\$133,756	\$526,391
	General Aviation	No	Willapa Harbor Airport	\$0	\$213,874	\$145,390	\$359,264
	General Aviation	No	Wilson Creek Airport	\$36,177	\$0	\$18,246	\$54,423
<b>Total Estimated Cost</b>				<b>\$5,430,095</b>	<b>\$1,104,226</b>	<b>\$2,053,058</b>	<b>\$8,587,379</b>
<b>Washington Recreation or Remote Airports</b>							
Recreation or Remote	General Aviation	No	Crest Airpark <sup>1</sup>	\$304,668	\$771,266	\$116,353	\$1,192,288
	General Aviation	No	De Vere Field <sup>1</sup>	\$186,443	\$0	\$40,818	\$227,261
	General Aviation	No	Desert Aire	\$28,843	\$101,318	\$7,815	\$137,976
	General Aviation	No	Elma Municipal Airport <sup>1</sup>	\$257,950	\$19,378	\$151,902	\$429,230
	General Aviation	No	Firstair Field <sup>1</sup>	\$249,374	\$34,285	\$377,820	\$661,480
	General Aviation	Yes	Ione Municipal Airport	\$0	\$82,495	\$33,991	\$116,486
	General Aviation	No	Lynden Municipal Airport	\$150,840	\$32,929	\$0	\$183,769

Major rehabilitation and global maintenance funding needs through 2012 (continued).

State Classification	FAA Classification	NPIAS	Airport Name	Funding Needs by Use			Total Funding Needs
				Runway	Taxiway	Apron	
Recreation or Remote	General Aviation	No	Martin Airfield <sup>1</sup>	\$461,510	\$1,362,527	\$0	\$1,824,037
	General Aviation	No	Mead Flying Service <sup>1</sup>	\$281,407	\$0	\$20,865	\$302,272
	General Aviation	Yes	Methow Valley State Airport	\$0	\$198,742	\$28,838	\$227,580
	General Aviation	Yes	Quillayute State Airport	\$3,343,983	\$0	\$0	\$3,343,983
	General Aviation	No	Ranger Creek State Airport	\$312,732	\$0	\$0	\$312,732
	General Aviation	No	Sequim Valley Airport <sup>1</sup>	\$0	\$0	\$298,264	\$298,264
	General Aviation	No	Spanaway Airport <sup>1</sup>	\$227,799	\$304,604	\$134,517	\$666,921
	General Aviation	No	Swanson Field	\$0	\$0	\$0	\$0
	General Aviation	No	Western Airpark <sup>1</sup>	\$57,050	\$0	\$2,063	\$59,113
	General Aviation	Yes	Whidbey Airpark	\$0	\$0	\$0	\$0
	General Aviation	No	Woodland State Airport	\$279,998	\$0	\$0	\$279,998
<b>Total Estimated Cost</b>				<b>\$6,142,598</b>	<b>\$2,907,545</b>	<b>\$1,213,247</b>	<b>\$10,263,390</b>

<sup>1</sup>These airports are not eligible for state funding.